

Trinity College - Dublin

February 17. 1838-

Dear Sir,

I have received your letter of the 12th inst. relative to the conduct of magnetical observations in India - I rejoice greatly that such a noble field for research, of this nature is now at length likely to be efficiently occupied; and I hasten to communicate such suggestions for your consideration as appear to me of most importance -

You are aware that the instruments & methods of observation as a fixed observatory must be, for the most part, different from those adopted by travelling observers - The objects of inquiry are altogether different; and in the former case a degree of precision is demanded, which cannot be expected, & is not sought for, in the latter - I conclude from your letter that your inquiries are directed, chiefly, to the course to be pursued as a

fixed observatory - The subject is one to which I have given much anxious consideration - In the present state of magnetical Science, the ends to be attained are probably much more important than in the other case -

One of the great problems to be solved is a magnetical observatory, appears to me to be the determination of the diurnal, menstrual, & annual changes of the 3 magnetic elements - the variation; Dip & Intensity. For this purpose, two magnetical instruments might suffice - but it will be probably better to employ one for each element -

1. Gauss's apparatus is, undoubtedly, the instrument best adapted to the observation of the diurnal variation, as well as the large & frequent perturbations of the variation - Notwithstanding the high authority of Prof. Christie & Mr. Airy, I have no doubt whatever of the superiority of heavy bars (thus suspended) above light ones - I have observed with this apparatus how for some time (one made for me at Göttingen, under the superintendence of M. Gauss himself) - and I cannot speak too highly of its performance - It has superseded Gauss's apparatus all throughout Germany -

and is, I think, likely to displace it everywhere - The letter which I have recently received from Baron Humboldt, he speaks in language of Gauss's apparatus, and of its superiority to the French instrument, in favor of which he appears to have been at first prejudiced -

There is however one disadvantage in this instrument - Its magnetic bar (4 lbs. in weight) can hardly be used in the neighborhood of other magnetical instruments - In Germany this evil is not felt - because the observatories have devoted themselves exclusively to one class of observations - I put the objection so strongly that I mean to employ a bar of only half the linear dimension - and I have substituted for the principle of the collimator for the reflecting ~~principle~~ principle adopted by Gauss - the former appearing to me better adapted to the observation of the absolute variation - The same modification in the instrument has been adopted likewise by Mr. Airy, to whom it suggested itself about the same time - I enclose a brief account of this instrument, and a peculiar mode of using it for the absolute variation - of the success of which I feel very sanguine -

Get - if you have unlimited Command of space, & of building - I should recommend a separate room, fitted up for Gauss's apparatus alone -

2. The Dip circles of Gambey are by much the best that are made - It will be worth while to consider whether you should not also have an apparatus specially adapted to the observation of the diurnal changes in the Dip - Such an instrument has been made by Gambey for M. Kupffer of Petersburg. It is described in a late vol. of the Petersburg Trans. & appears to answer well -

3. The diurnal variations of the magnetic Intensity may be observed in various ways - I have not yet ordered an instrument myself for that purpose - but am inclined to prefer a needle, fitted up like the collimator needle already described, - but with this difference, that it is suspended by two sets of suspending fibres (after the manner of W. Harris's apparatus of torsion) instead of one - With such apparatus the needle should be twisted into a position at right angles to the magnetic meridian, and

the changes in its direction observed by a telescope furnished with a micrometer - From these changes, the diurnal changes of ^{the horizontal} intensity are immediately deducible -

I am not able, at present, to say anything satisfactory with regard to the hours of observation - Gauss observes twice every day - namely at the hours of max. & min. declination - M. Kreil, of Milan, observes six times - & M. Kupffer - eight times daily - I am inclined to think that this is too much or too little - Too much, if it be intended to catch the amount of the daily change alone - & too little, if we desire to know the law & the representation of the curve - I should prefer hourly observations, made for two or three days in the week, to two hourly observations, taken daily -

Besides the stated observations, the Director of your observatory will of course take a part in the simultaneous observations of the horizontal needle, which are now yielding such interesting results to magnetic Science on the Continent - In these observations - which are taken every five minutes during 24 hours - your principal observer will require at

least two assistants - the results hitherto obtained clearly show that the magnitude of the simultaneous perturbations of the needle diminishes as the station of the observer approaches the magnetic equator - But as all the stations as yet in operation are pretty far northward, you will be able to supply a most important desideratum in this new & beautiful field of investigation -

The results of these simultaneous observations you will find in a little volume recently published by Gauss & Weber - "Resultate aus den Beobachtungen der bob. contains also a description of the apparatus -

The collimator needle, to which I have alluded, is in the hands of Mr. Jones - 62 Chancery Cross - I sent for it some days ago - but it has probably not yet left London - The large theodolite intended for the Dublin Observatory is in the hands of Mr. Simms (Draughton & Simms) who will be happy to show it to you -

I shall feel very great pleasure in communicating the results of my own inquiries on any ~~specific~~ point connected with this subject, on which you may desire further information - and I look forward with much pleasure to the time when your magnetic station shall be completed, & in operation - I wish the little that I am able to effect myself in this remote quarter may derive a large accession of interest from comparison with your results -

You will have attained a great point for ~~your~~ ^{your} ~~work~~ ^{work} & general science - if, as you seem to hope, you are able to gain the services of Major Sabine to its cause - in India - His great experience as an observer - his skill in detecting the various sources of instrumental error - (without which the most accurate can do nothing) - and his wide knowledge of all the bearings of magnetic Geography - all point him out as the individual best fitted to guide & lay out an enterprise - There can be no doubt that at this moment, Britain is behind her Continental neighbours in all that relates to this branch of science - I hope

The time has nearly arrived when this disgrace shall be
removed - and I know of nothing which would so much
conduce to the result as the employment of such a man
in such a field of labour -

Recd 24 Feb.



Captain J. B. Lewis

26 Dorchester Square

Rev. Professor H. Lloyd F.R.S.
mathematics & physics

Believe me to be, Dear Sir,
Very faithfully yours
H. Lloyd -
Captain J. B. Lewis -

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PROBLEMS OF
MAGNETIC RESEARCH

584 LLOYD, HUMPHREY. British
Scientist; noted for his researches in op-
tics. A.L.s. $7\frac{1}{2}$ pages. Trinity College,
Dublin, February 17, 1837. \$20.00

Extremely fine and long letter in which he
states his opinions on the problems to be
solved in magnetic research and in which he
describes the various instruments to be used
in attaining that end. See infra letter on the
same subject by Edward Sabine.

576 JACKSON, ANDREW. President
of the U. S. L.s. 2pp., 4to. Nashville,
June 24, 1816. **\$20.00**

To the Secretary of War, Marked "Free"
on the address leaf. A long letter mainly on
the problems arising in the building of the
military road thru Madison County to New
Orleans and on a forthcoming Court Martial
involving Col. Croghan. He writes: "I have
every reason to believe Col. Croghan will be
able to shew to the government that in none
of his acts has he departed from Justice or
Military Rules...."